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Indian Standard
**SPECIFICATION FOR
PUMPS FOR HANDLING PAPER STOCK**

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR PUMPS FOR HANDLING PAPER STOCK

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Indian Standard

SPECIFICATION FOR PUMPS FOR HANDLING PAPER STOCK

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 21 July 1972, after the draft finalized by the Pumps Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Paper stock is the stock, such as bleach, unbleach or semi-bleach used in pulp, paper, cardboard, pulp-board and newsprint industries. It may be from raw material, such as bamboo, wood, bagasse, rag, straw, or grass.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the technical requirements for rotodynamic pumps (that is, centrifugal, axial flow, mixed flow, turbo pumps) for handling paper stock.

1.2 This standard is not intended to cover requirements for rotodynamic pumps handling slurry other than paper stock.

2. UNITS, TERMINOLOGY AND CLASSIFICATION

2.1 Units, terminology and classification relating to pumps for paper stock shall be as specified in IS: 5120-1968†.

3. CHARACTERISTICS OF PAPER STOCK

3.1 Characteristics of paper stock shall be as mentioned below:

- | | |
|------------------|------------------|
| a) Fibre content | 0.5 to 6 percent |
| b) pH | 3 to 12 |

*Rules for rounding off numerical values (*revised*).

†Technical requirements for rotodynamic special purpose pumps.

- c) Temperature 5 to 100°C
- d) Fibre size 3 mm, *Max*
- e) Free air content 2 g/l at NTP

3.2 Characteristics of various paper stock met with in the different industries are given in Table 1.

4. NOMENCLATURE

4.1 Nomenclature of the parts commonly used in rotodynamic pumps for paper stock shall be as given in IS : 5659-1970*.

5. MATERIALS OF CONSTRUCTION

5.1 It is recognized that a number of materials of construction are available to meet the needs for pumps handling paper stock. Recommended materials of construction are given in Tables 1 and 2.

Wrought materials, such as those used for shaft, may be either of similar composition to the castings used or suitable shaft protections should be provided against corrosion. Most of the parts are primarily castings.

5.2 Gaskets, Seals and Packings — Gaskets, seals and packings used for pumps handling paper stock shall conform to those specified in IS : 5120-1968†.

TABLE 1 CHARACTERISTICS OF PAPER STOCK

(Clauses 3.2 and 5.1)

SL No.	NATURE OF PULP	FITTING SELECTION No. (See TABLE 2)	CHARACTERISTIC		
			Temperature °C	pH	Consistency percent
i)	Cooked pulp	2	80 to 100	10 to 12	2 to 4
ii)	Washed unbleached pulp	1, 2	40 „ 60	7 „ 9	5 „ 6
iii)	Washed and screened unbleached pulp	1, 2	10 „ 40	7 „ 9	0.5 „ 6
iv)	Chlorinated pulp	5, 6, 7	10 „ 75	4 „ 6	0.5 „ 6
v)	Bleached pulp, unwashed	1, 4, 5	10 „ 75	5 „ 8	0.5 „ 6
vi)	Bleached pulp, washed	1, 4, 5	10 „ 60	6 „ 7	0.5 „ 6
vii)	Paper stock with additives	5	10 „ 40	3 „ 5	0.5 „ 4

*Specification for pumps for process water.

†Technical requirements for rotodynamic special purpose pumps.

TABLE 2 MATERIALS OF CONSTRUCTION FOR PUMPS HANDLING PAPER STOCK

(Clause 5.1)

FITTING SELECTION No.	MATERIAL OF CONSTRUCTION	SPECIFICATION
1	Bronze fitted	IS : 28-1969*
2	All iron	Grade 20 of IS : 210-1970†
3	All bronze	Grade V of IS : 318-1962‡
4	Stainless steel fitted	Schedule V of IS : 1570-1961§
5	All stainless steel	Schedule V of IS : 1570-1961§
6	Rubber lined	Shore hardness 60 to 90 suitable for pH 3 to 7 and chlorine resistant

*Specification for phosphor bronze ingots and castings (*second revision*).

†Specification for grey iron castings (*second revision*).

‡Specification for leaded tin bronze ingots and castings (*revised*).

§Schedules for wrought steels for general engineering purposes.

6. DIRECTION OF ROTATION

6.1 The direction of rotation of pumps shall be designated clockwise or anti-clockwise as observed when looking at the pump shaft from the driving end.

6.2 The direction of rotation shall be clearly marked either by incorporating an arrow in the casting or by a separate metal arrow securely fitted to the pump.

7. ACCESSORIES

7.1 In addition to essential and optional accessories specified in IS : 5120-1968*, provision shall be made for fitting the auxiliary piping as indicated below:

- Stuffing box sealing water connections shall be provided to the lantern rings,
- Impeller back vanes flushing arrangements shall be provided to the stuffing box,
- Inspection hand holes with covers shall be provided in the suction and volute chamber of the pump, and
- Stuffing box cooling water connection shall be provided for pumps handling liquid above 95°C.

*Technical requirements for rotodynamic special purpose pumps.

IS : 6596 - 1972

8. SUCTION LIMITATIONS

8.1 The pumps shall have always suction lift or suction head well within the NPSH (net positive suction head) requirements of the working conditions.

9. FACTORS AFFECTING PUMP PERFORMANCE

9.1 Factors affecting pump performance are the same as those specified in IS : 5659-1970*.

10. ESSENTIAL DESIGN FEATURES

10.1 The pumps shall have suitable features properly designed to ensure satisfactory performance.

10.2 For working in parallel, pumps should be with stable head capacity curves.

10.3 The design shall have provision for the following:

- a) Renewable gland sleeve over the shaft,
- b) Renewable from wear plate, and
- c) Impeller shall have back cleaning vanes.

11. INFORMATION TO BE SUPPLIED BY THE PURCHASER AND THE SUPPLIER

11.1 The information to be supplied by the purchaser and the supplier shall be the same as that specified in IS : 5659-1970*.

12. PUMP TESTS

12.1 Pump tests shall be the same as those specified in IS : 5120-1968† with the modification that 100 percent testing should be done.

13. DETERMINATION OF PERFORMANCE OF THE PAPER STOCK PUMPS

13.1 Figures 1 and 2 provide means of determining the performance of a rotodynamic pump handling paper stock when its performance with water is known. It may also be used as an aid in selecting a pump for a given application.

*Specification for pumps for process water.

†Technical requirements for rotodynamic special purpose pumps.

13.2 The following symbols and definitions shall be used:

Q_{p_s} = capacity when pumping paper stock in m³/h,

H_{p_s} = total head when pumping paper stock in metres,

E_{p_s} = efficiency (percent) when pumping paper stock,

P_{p_s} = power required by the pump when handling paper stock,

Q_w = water capacity in m³/h (the capacity when pumping water),

H_w = water head in metres (the total head when pumping water),

E_w = water efficiency (percent) (the efficiency when pumping water),

KHC = head capacity correction factor,

KE = efficiency correction factor, and

ρ = specific gravity.

13.3 The following equation shall be used for determining the pump performance for handling paper stock when water performance of the pump is known:

$$P_{p_s} = \frac{Q_{p_s} \times H_{p_s} \times \rho}{2.08 \times E_{p_s}}$$

where

$$Q_{p_s} \times H_{p_s} = Q_w \times H_w \times KHC, \text{ and}$$

$$E_{p_s} = E_w \times KE$$

Figures 1 and 2 provide the head capacity correction factor (KHC) for different percent water capacity at best efficiency point.

Q_w , H_w and E_w shall be known when the water performance of the pump is known.

14. GUARANTEES

14.1 Guarantee of Workmanship and Material — The pumps shall be guaranteed by the manufacturer against defects in material and workmanship, under normal use and service, for a period of at least one year.

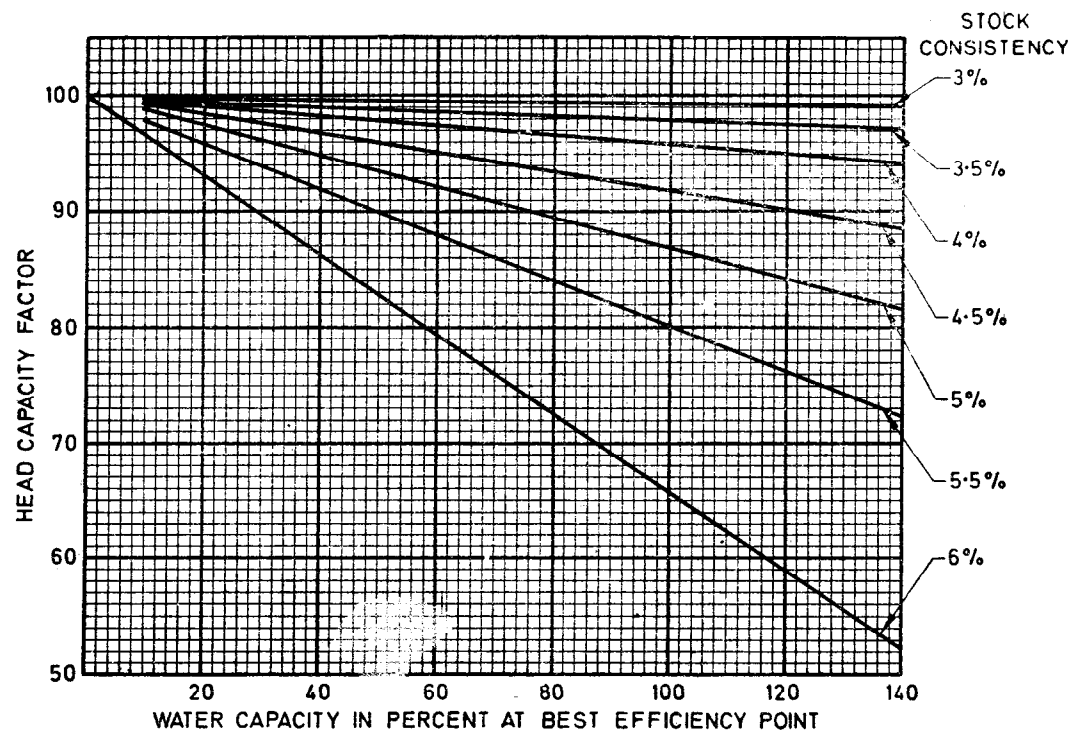


FIG. 1 HEAD CAPACITY CORRECTION FACTORS FOR CHEMICAL STOCK (SODA, SULPHITE, SULPHATE, KRAFT, SEMI-CHEMICAL)

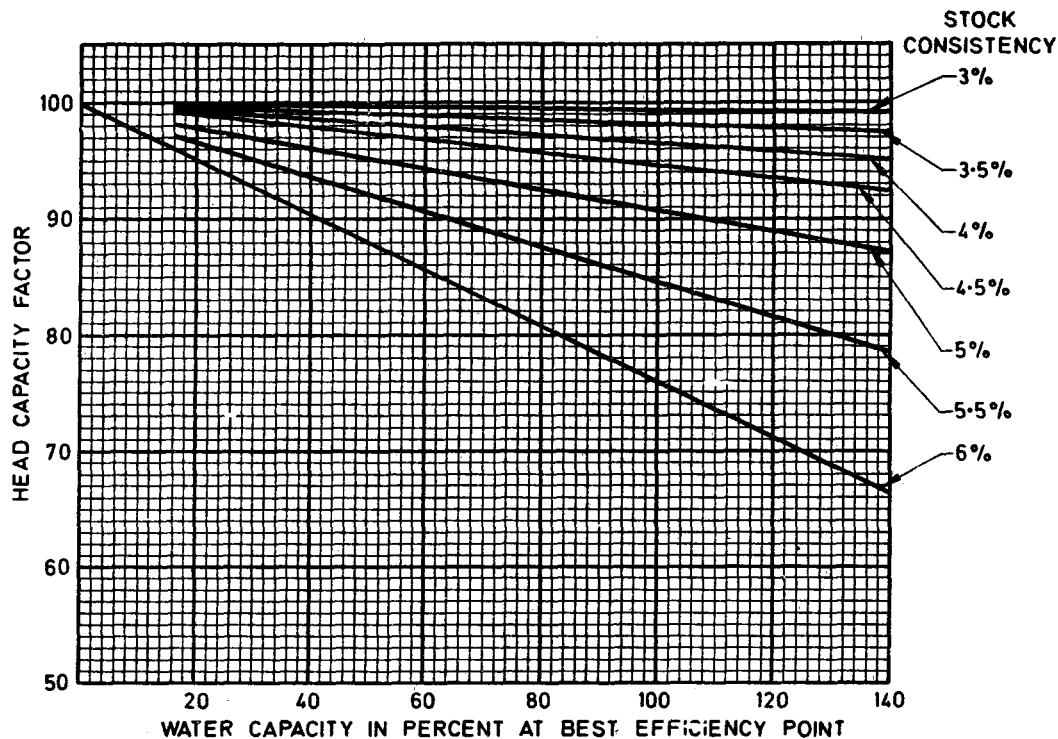


FIG. 2 HEAD CAPACITY CORRECTION FACTORS FOR MECHANICAL GROUNDWOOD AND RECLAIMED STOCK

14.2 Guarantee of Performance—The supplier shall indicate the working range of the pump and the efficiency of the pump shall be guaranteed at a specified point of rating only and shall not be guaranteed to cover the performance of the pump under conditions varying there from or for a sustained performance for any period of time. If the purchaser so desires, the manufacturer shall guarantee the non-overload of the prime-mover for variation in the head in the working range. In the case of the pumps where acceptance cannot be conducted on the liquid for which the pump is designed, the manufacturer shall indicate the liquid performance of the pump based on the results of the tests conducted by him on the pump with water as indicated in **12**, and interpolated as specified in **13**. However, in these cases, the manufacturer shall guarantee the performance of the pump with water for the specified range.

15. TOLERANCES

15.1 In all commercial acceptance tests of pumps, a certain tolerance shall be allowed to the manufacturer on his guarantee to cover inaccuracies of the equations for discharge, errors of observation and unavoidable minor inaccuracies of the instrument employed.

15.2 A tolerance of ± 2.5 percent shall be permissible on the discharge. However, for small discharges up to 900 litres per minute, a tolerance of $+ 2.5$ percent or $+ 24$ litres per minute whichever is higher, is allowed, while the negative tolerance of 2.5 percent is maintained.

15.3 The percentage pump efficiency shall be not less than the specified value by more than 2.5 percent. This tolerance may be raised to 5 percent in case of prime-mover does not get overloaded.

16. GENERAL REQUIREMENTS

16.1 The general requirements for the pumps for handling paper stock shall be as given in IS : 5120-1968*.

*Technical requirements for rotodynamic special purpose pumps.

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